Letter of Intent to Conduct Research:

Studies of juvenile Pacific lamprey separation, telemetry, and survival at McNary Dam and the Snake River Dams.

Submitted in response to AFEP Request for Proposals
STUDY CODE: BPS-W-00-04

Project Leaders

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Multi-year project, 2007-2010

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Background and Description:
Pacific lamprey (*Lampetra tridentata)* populations in the Columbia Basin have declined recently (Close et al. 2002). Multiple impacts have been implicated with this decline, including habitat alteration, declines in water quantity and quality, and development of hydroelectric projects (Close et al. 2002, Moser et al. 2002). Consequently, an understanding of how juvenile lamprey pass dams is critical for the effective management of this species in the face of continuing depressed population size.

Goal:
Here we briefly describe four study objectives that will provide critical information about juvenile Pacific lamprey passage at Snake River dams. Recognizing that the Corps will be unable to fund the proposed work through normal processes, we submit these as one or more separate potential future study objectives. We also request that these objectives remain internal and not included in the public one-pager presentations.

Objectives:

1. **To a) identify areas within the JBS which collect or impede juvenile Pacific lamprey passage at McNary and Snake River dams; and, b) to identify, implement, and test modifications at problem locations. Most likely modifications are to separators, raceway screens, and stop logs. The primary aim will be to evaluate the effects of recent screen modifications on retention of juvenile lamprey, and salmonid fry and juveniles. We will use the data to assess whether modifications to the NOAA-Fisheries screening criteria are warranted.**

   Methodology--This study would include two components. First, we would conduct a detailed assessment of how many juvenile lamprey were moving through the JBS system and identify areas of accumulation using field studies during the passage season and interviews with Corps biologists. In particular, we would estimate the number of juveniles that enter the JBS but are separated and returned to the river prior to reaching the juvenile collection facility. The second component would be a comparison of the response and retention of juvenile lamprey and salmonid juveniles and fry under simulated operational conditions using the new versus old perforated plate and raceway screens from Lower Monumental Dam. These data would provide justification for modifying or obtaining an exemption from NOAA-fisheries screening criteria. The information will also open design and modification possibilities for improving juvenile lamprey separation.

2. **To develop biologically-based design criteria for juvenile Pacific lamprey telemetry tags. These criteria will identify the maximum tag dimensions that will provide biologically meaningful results in future field telemetry studies.**

   Methodology--We submitted this as a full proposal for 2006 and the work would build on that of Schreck et al. 2001 and Moursund et al. (2000, 2001, 2002). Given the current technology, we propose that the most cost-efficient approach to tag

development is to determine the required biological criteria for an adequate tag *a priori* rather than through trial and error as each "next smaller tag" is developed. Importantly, we would test how tag shape affects retention and survival as well as size and weight; information that would guide the development of an adequate tag.

3. a) Estimate the proportion of juvenile lamprey injured or killed by dam/turbine passage, and, b) to estimate avian predation rates on juvenile Pacific lamprey in tailraces at Lower Snake River dam tailraces.

Methodology--Recently, we have heard reports from Corps biologists at Little Goose Dam of frequent gull predation on juvenile lamprey prior to the onset of avian control efforts during the peak lamprey out-migration. These anecdotal observations suggest one or more of the following: that dam passage causes lamprey to be upwelled to surface where they are susceptible to gulls, that injury during passage contributes to susceptibility, and that beginning avian control efforts earlier in the run season may be warranted at some locations.

Given the dearth of information on the effects of dam passage on juvenile lamprey, we propose to conduct several straightforward studies. First, we will collect juvenile lamprey from dam forebays and tailrace as in Long (1968) and compare the proportions of live vs. dead, injured vs. uninjured, and the types of injury above and below study Dams. Second, we will examine the gut contents of Northern Pikeminnows caught in the predator control program as a second, though more limited, estimate of injury rates. If all lamprey in Pikeminnow guts are injured, this may simply indicate that Pikeminnows are strongly selective in their predation. However, if all lamprey are uninjured, this would suggest low injury rates, especially given the potential for selective predation on injured lamprey by Pikeminnows. Observations of gull predation will provide estimates of predation rates and prey types taken, including an estimate of the proportion of salmonids versus lamprey taken.

4. Prepare a multi-year summary report of juvenile lamprey counts from Snake River Juvenile Collection Facilities.

Methodology--The rather simple aim would be to describe trends from data in passage reports collected by WDFW at the JBS over the last approximately ten years and to look for spatial patterns. In particular, we would examine the data for evidence of high mortality between projects, indicated by large declines in the number of juvenile at downstream projects that could not be accounted for by collection and barging.

Relevance:

This project will address concerns raised by Tribal agencies, the U. S. Army Corps of Engineers (COE), and the Northwest Power Planning Council in section 7.5F of the 1994 Columbia River Basin Fish and Wildlife Program, related to effects of FCRPS Projects on passage of Pacific lamprey in the Columbia and Snake rivers. The loss of Pacific lamprey as a cultural resource has raised concerns among Columbia River tribes (Close et al. 2002). Improving lamprey

passage at Columbia River hydropower dams was identified as the highest priority for lamprey recovery by the Columbia Basin Pacific Lamprey Technical Workgroup. In addition, in 2002 the U.S. Fish and Wildlife Service received a petition to list Pacific lamprey as a federally-endangered or threatened species. Lamprey are currently not listed but interest and desire by multiple groups is increasing to improve the productivity of this endemic species within the Columbia River system.

Impacts:

Objectives and methods proposed in this lette of intent were developed following consultation with several of the Biologists at Snake River dams to discuss concerns and needs for dealing with passage and management of juvenile lamprey. Study objectives outlined here would be conducted in cooperation with Corps, State and NMFS biologists. It is not anticipated that there would be significant disruption of dam or juvenile salmon handling operations from implementation of any or all of the proposed objectives.

Literature Cited:

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